

CLAIMS

Having thus described the invention what is claimed is:

- 5 1. A magnetic linear displacement sensor comprising:
a Hall element having a sensor plate surface; and
at least one magnet having a lengthwise dimension along which said
Hall element detects a magnetic field component orthogonal to the sensor
plate surface during displacement sensing, said magnet comprising first and
10 second pole faces disposed on opposite lengthwise sides thereof and having
a polarization axis aligned orthogonally with respect to the lengthwise
dimension, said first pole face opposing said Hall element and having a non-
planar surface contoured to generate a substantially linear orthogonal
magnetic field component sensed by said Hall element during linear
15 displacement sensing.
2. The magnetic linear displacement sensor of claim 1, wherein said Hall
element and said magnet are mutually disposed in a manner wherein the
contoured first pole face of said magnet opposes said Hall element and
20 wherein the sensor plate surface is oriented in parallel with the polarization
axis of said magnet.
3. The magnetic linear displacement sensor of claim 1, wherein said at least
one magnet is moveable in a linear sensing path with respect to said Hall
25 element, the sensing path being substantially parallel to the lengthwise
dimension of said at least one magnet.
4. The magnetic linear displacement sensor of claim 1, wherein the surface
contour of the first pole face is bounded at the ends of the lengthwise
30 dimension of said magnet by lateral edges, and wherein the contour of the
first pole face is characterized as generally sloping upward from each of the

lateral edges and peaking at approximately the midpoint between the lateral edges.

5 5. The magnetic linear displacement sensor of claim 4, wherein the contour of the first pole face slopes upward from each of the lateral edges in a convex manner.

6. The magnetic linear displacement sensor of claim 1, wherein said Hall element is coupled to a fixed mounting site.

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7. The magnetic linear displacement sensor of claim 6, wherein said at least one magnet is coupled to a linearly moving mounting site to effectuate a relative linear displacement between said Hall element and said at least one magnet.

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8. The magnetic linear displacement sensor of claim 1, wherein the sensor plate surface of said Hall element is disposed orthogonally with respect to the lengthwise dimension of said at least one magnet.

20 9. The magnetic linear displacement sensor of claim 1, wherein said at least one magnet comprises first and second permanent magnets, said first and second permanent magnets mutually disposed such that the contoured first pole faces of said first and second permanent magnets are aligned in mutual opposition to form a sensing corridor therebetween, said Hall element plate
25 disposed within the sensing corridor substantially centered between the contoured first pole faces of said first and second permanent magnets.

10. The magnetic linear displacement sensor of claim 1, wherein each of said at least one magnet is characterized as having a length of 23.0 mm, a
30 width of 4.0 mm, and a varying height, H, wherein H varies in a symmetrically convex sloping from 4.23 mm at the ends to 5.60 mm at the center.

11. A magnetic linear displacement sensor comprising:
a Hall element having a sensor plate surface; and
first and second permanent magnets each having a first pole face
disposed on a convex contoured lengthwise side and a second pole face
5 disposed on an opposite lengthwise side thereof, and each having a
polarization axis aligned orthogonally with respect to the lengthwise
dimension, said first and second permanent magnets mutually disposed
such that the contoured first pole faces are aligned in mutual opposition to
form a sensing corridor therebetween, said Hall element plate disposed
10 within the sensing corridor substantially centered between the contoured first
pole faces.
12. The magnetic linear displacement sensor of claim 11, wherein the
surface contour of each of the first pole faces is bounded at the ends of the
15 lengthwise dimension by lateral edges, and wherein the contour of the first
pole face is characterized as generally sloping upward from each of the
lateral edges and peaking at approximately the midpoint between the lateral
edges.
- 20 13. The magnetic linear displacement sensor of claim 11, wherein each of
said first and second permanent magnets is characterized as having a length
of 23.0 mm, a width of 4.0 mm, and a varying height, H, wherein H varies in
a symmetrically convex sloping from 4.23 mm at the ends to 5.60 mm at the
center.

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14. A magnetic linear displacement sensor comprising:
a Hall element having a sensor plate surface; and
first and second magnets aligned in a lengthwise opposing manner to
form a lengthwise sensing corridor in which said Hall element is disposed
5 during displacement sensing, each of said first and second magnets having
at least one lengthwise side contoured to generate a substantially linear
orthogonal magnetic field component sensed by said Hall element during
linear displacement sensing.
- 10 15. The magnetic linear displacement sensor of claim 14, wherein the
contour of the contoured at least one lengthwise side is characterized as
generally sloping upwardly from each of the ends of the lengthwise sides and
peaking at approximately the midpoint therebetween.
- 15 16. The magnetic linear displacement sensor of claim 14, wherein each of
said first and second magnets include first and second pole faces disposed
at each lengthwise end thereof such that said first and second magnets have
polarization axes substantially in parallel with the lengthwise sensing
corridor.
- 20 17. The magnetic linear displacement sensor of claim 14, wherein each of
said first and second magnets is characterized as having a length of 23.0
mm, a width of 4.0 mm, and a varying height, H, wherein H varies in a
symmetrically convex sloping from 4.23 mm at the ends to 5.60 mm at the
25 center.